



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/736,921

12/16/2003

Di Wei

60246-220; 10,691

5823

26096

7590

11/29/2006

CARLSON, GASKEY & OLDS, P.C.  
400 WEST MAPLE ROAD  
SUITE 350  
BIRMINGHAM, MI 48009

EXAMINER

MAYEKAR, KISHOR

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 11/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/736,921

Applicant(s)

WEI ET AL.

Examiner

Kishor Mayekar

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 7 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

1. Applicant's arguments, see the arguments in the Appeal Brief, filed 7 September 2006, with respect to claims 1-35 have been fully considered and are persuasive. The rejection of claims 30 and 33 under the 1<sup>st</sup> paragraph of 35 US 112 and the rejection of claims 1-35 under 35 USC 103 have been withdrawn.

### *Claim Objections*

2. Claim 3 is objected to because of the following informality: the phrase "Co<sub>3</sub>O<sub>4</sub>" with the incorrect subscript 4. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

3. Claims 30 and 33 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 30, the claim is indefinite because the variable x in the recitation Mn<sub>x</sub>O<sub>2</sub> is not defined.

In claim 33, the same is applied to claim 30.

### *Claim Rejections - 35 USC § 102 and § 103*

Art Unit: 1753

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-12, 17-20, 28, 30 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kobayashi et al. (US 6,368,668 B1). Kobayashi, a reference cited in previous Office action, is directed to a method and apparatus for producing a photocatalytic material. Kobayashi discloses in the section "Background Of The Invention" that "photocatalysts have been drawn attention as materials that, upon light irradiation, cause adsorption of oxygen molecules on bacteria, mold, and organic compounds, such as offensive odor components, or desorption of oxygen molecules therefrom and accelerate the decomposition (oxidation) of the organic compounds" and is useful for waste water treatment and purification of harmful gases. Kobayashi discloses the photocatalytic material being formed by coating a photocatalyst composition of a photocatalyst metal oxide on a substrate (col. 3, lines 28-67). Kobayashi also discloses in paragraph crossing cols. 5 and 6 that the photocatalyst coating

Art Unit: 1753

composition may further comprises a metal and/or metal oxide to improve its photocatalytic activity, wherein the metal and/or metal oxide such silver, platinum, manganese, gold and oxide of silicon is supported on the surface of the photocatalyst metal oxide; and in col. 10, lines 17-30 that a multi-layered coating of the photocatalyst composition may be formed on the substrate and the multi-layered coating may formed from a plurality of different photocatalyst coating composition. Since Kobayashi discloses that a multi-layered catalytic coating from a plurality of different photocatalyst coating compositions form on a substrate wherein the different photocatalyst coatings include all the recited coatings of a photocatalytic coating (titanium oxide or metal compound loaded titanium oxide), a photocatalytic metal loaded metal compound coating, and a coating of gold on titanium oxide, and the use of the photocatalytic material in the purification of gases and since the above claims do not recite the order of the coating layers, Kobayashi anticipates the above claims. If there is a difference, it will be the selection of the recited coating layers. However, since Kobayashi discloses that a multi-layered coating may formed from a plurality of different photocatalyst coating compositions, the selection of the multi-layered coating from the plurality of different photocatalyst coating composition would be within the level of ordinary skill in the art.

As to the subject matter of claim 4, Kobayashi discloses it in Examples that a thin layer of less than 2  $\mu\text{m}$ .

As to the subject matter of each of claims 10 and 12, Kobayashi's multi-layered

coating inherently possesses it.

As to the subject matter of each of claims 17-20, Kobayashi discloses the light source in col. 17, lines 54-59 in the application of removing salad oil from a photocatalytically-coated substrate.

7. Claims 13-16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '668. The difference between Kobayashi as applied above and the instant claims are each of the limitations recited in the instant claims.

As to the subject matter of claims 13-16, to the sequence of the recited layers, since there is no unexpected results from the recited sequence layers and since the specification discloses that each of the layers is used to absorb each of specific contaminants and, when one specified contaminant is adsorbed on one of the layers, each of the non-adsorbed contaminants is able to diffuse through the layer and adsorbs on the subsequent layer, Kobayashi's applied layers though general and random is equivalent to the recited sequence layers in the purification of the fluid for the adsorption of contaminants. Further, rearrangement of parts was held to have been obvious, *In re Japikse* 86 USPQ 70.

As to the subject matter of claim 21, since the coating layers are applied by spray, brush or sponge coating (col. 9, lines 48-55), the applied coating layers are inherently porous from such coating methods, especially when the substrate is porous such as woods.

8. Claims 29 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '668 in view of Reisfeld et al. (US 2003/0021720 A1). Kobayashi as applied above discloses in col. 3, lines 28-47, that the substrate is any substrates upon which a photocatalyst material is coated. The difference between Kobayashi and the instant claims is the provision that the substrate is a honeycomb. Reisfeld, another reference cited in previous Office action, shows the limitation in paragraph [0022] in a photocatalytic fluid purification system. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Kobayashi's teachings as shown by Reisfeld because the selection of any known equivalent substrates for the photocatalytic fluid purification would be within the level of ordinary skill in the art.

9. Claims 17-20, 22, 23 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '668 in view of Reisfeld '720. The difference between Kobayashi as applied above and the instant claims is the provision that the system comprises the recited container, device and/or UV light source. Reisfeld shows in a photocatalytic fluid purification system the recited provision (Fig.1). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Kobayashi's teachings as shown by Reisfeld because

Art Unit: 1753

this would result in the application of Kobayashi's photocatalytic metal to a photocatalytic fluid purification system (photocatalytic air purifier).

10. Claims 24-27, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reisfeld '720 in view of Kobayashi '668. Reisfeld, a reference applied above, discloses in a photocatalytic fluid purification system the provision of three honeycomb photocatalytic filters (12,14,16) as shown in Fig. 1, each filter being coated with any suitable photocatalyst coating (paragraph [0024]). Kobayashi as applied above shows the provision of a plurality of photocatalyst compositions applied to a substrate (col. 10, lines 17-30) and a photocatalyst composition with the addition of metal and/or metal oxide to enhance the fluid purification (paragraph crossing cols 5 and 6). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Reisfeld's teachings as shown by Kobayashi because this would result in enhancing the photocatalytic fluid purification.

As to the subject matter of claim 27, the sequence of the recited ordered substrates, since there is no unexpected results from the recited ordered substrates and since the specification discloses that each of the substrates is used to absorb each of specific contaminants and, when one specified contaminant is adsorbed on one of the substrates, each of the non-adsorbed contaminants is able to diffuse through the substrate and adsorbs on the next substrate, Kobayashi's substrates though general and



Art Unit: 1753

random is equivalent to the recited ordered substrates in the purification of the fluid for the adsorption of contaminants. Further, rearrangement of parts was held to have been obvious, *In re Japikse* 86 USPQ 70.

11. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi '668 in view of Reisfeld '720 and in light of Applicant's admission. The references as applied above do not disclose that the forming of reactive hydroxyl radical and that air contains carbon monoxide. However, Applicant admits in paragraphs [2] and [3] that indoor air comprises carbon monoxide and hydroxyl radical is formed when titanium dioxide is illuminated with UV light. Since Kobayashi as modified by Reisfeld discloses the use a gold/metal oxide coating, the recited steps of lowering and oxidizing carbon monoxide are inherently in the references' teachings. As to the recited steps of forming and oxidizing contaminants are also inherently in the references' teachings.

#### ***Response to Arguments***

12. Applicant's arguments filed in the appeal brief of 7 September 2006 have been fully considered but they are not persuasive because of the new grounds of rejection as set forth above.

Further to the argument to the rejection of claims 30 and 33 under the 2<sup>nd</sup> paragraph of 35 USC 112 that the specification is not indefinite, the rejection stands

Art Unit: 1753

because the claims are rejected as being indefinite and not the specification as argued.

To the argument that there is no suggestion in any of the references to use three substrates each having a different coating as recited in claims 24-27, 32, 33, the examiner finds this is unpersuasive. First, it's because one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Second it's because Reisfeld discloses the provision of three honeycomb photocatalytic filters (12,14,16) as shown in Fig. 1, where each of the filters may be coated with any suitable photocatalyst coating (paragraph [0024]) and Kobayashi shows the provision of a plurality of photocatalyst compositions applied to a substrate (col. 10, lines 17-30) and a photocatalyst composition with the addition of metal and/or metal oxide to enhance the photocatalytic fluid purification (paragraph crossing cols. 5 and 6), it would have been obvious to employ a different photocatalytic coating on each Reisfeld's substrate as shown by Kobayashi as this would result in enhancing the photocatalytic fluid purification.

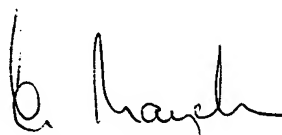
### *Conclusion*

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kishor Mayekar whose telephone number is (571) 272-1339. The examiner can normally be reached on Monday-Thursday.

Art Unit: 1753

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Kishor Mayekar  
Primary Examiner  
Art Unit 1753